

TO NANCY KOTAN
FROM DICK JESPERMAN
360 681-3681

**SAMPLING AND ANALYSIS PLAN
FOR MAINTENANCE DREDGING AT
THE LEVIN-RICHMOND TERMINAL CORPORATION
RICHMOND, CALIFORNIA**

Prepared for:

Levin-Richmond Terminal Corporation
402 Wright Ave.
Richmond, California 94804

Prepared by:

Advanced Biological Testing Inc.
5685 Redwood Drive, Suite 105
Rohnert Park, CA 94928

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1.0 INTRODUCTION

1.1 OVERVIEW

The Levin Terminal in the Port of Richmond is proposing to carry out a dredging project at their facility in Richmond, California (Figure 1). The dredging is being proposed to accommodate vessels utilizing the facility. Due to siltation the sides of the channel require dredging to prevent grounding.

The dredging sediments are proposed for disposal on Port of Richmond property. At the request of the Levin Terminal this sampling plan has been prepared to carry out the normal requirement for testing sediments in the bay for upland disposal and includes the analysis of asbestos as requested by the Port of Richmond. The test sample locations have been provided by Dr. Jack Gregg (RWQCB-SF).

This document is intended to support the application for regulatory permits to conduct this maintenance dredging at the site and dispose of the dredged material in the designated upland disposal site. The specific purpose of this document is to seek regulatory agency approval of a Sampling and Analysis Plan for sediment analysis.

1.2 HISTORICAL DREDGING ACTIVITIES

The site is on the corner of the Laurentzin Canal and the Santa Fe Channel. The Laurentzin Canal has been a historical contaminated waterway that has recently undergone remediation dredging and contaminated sediment removal.

1.3 QUANTITY CALCULATIONS

The quantity of sediment from the site was calculated by the Levin Richmond Terminal (Figure 2) and is shown below and includes a 1 foot overdredge allowance:

Site	Volume	Cores	Vol/core
Berth A	3.856	1	3.856
Berth B	7.942	3	2.648

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1.4 ORGANIZATION

This proposal follows guidelines provided in the testing guidelines established by the ACOE, Regional Water Quality Control Board, BCDC and the U.S.EPA (1998). The soluble testing follows RWQCB guidelines.

This proposal is organized as follows:

- Section 1.0: Introduction
- Section 2.0: Proposed Scope of Work
- Section 3.0: References

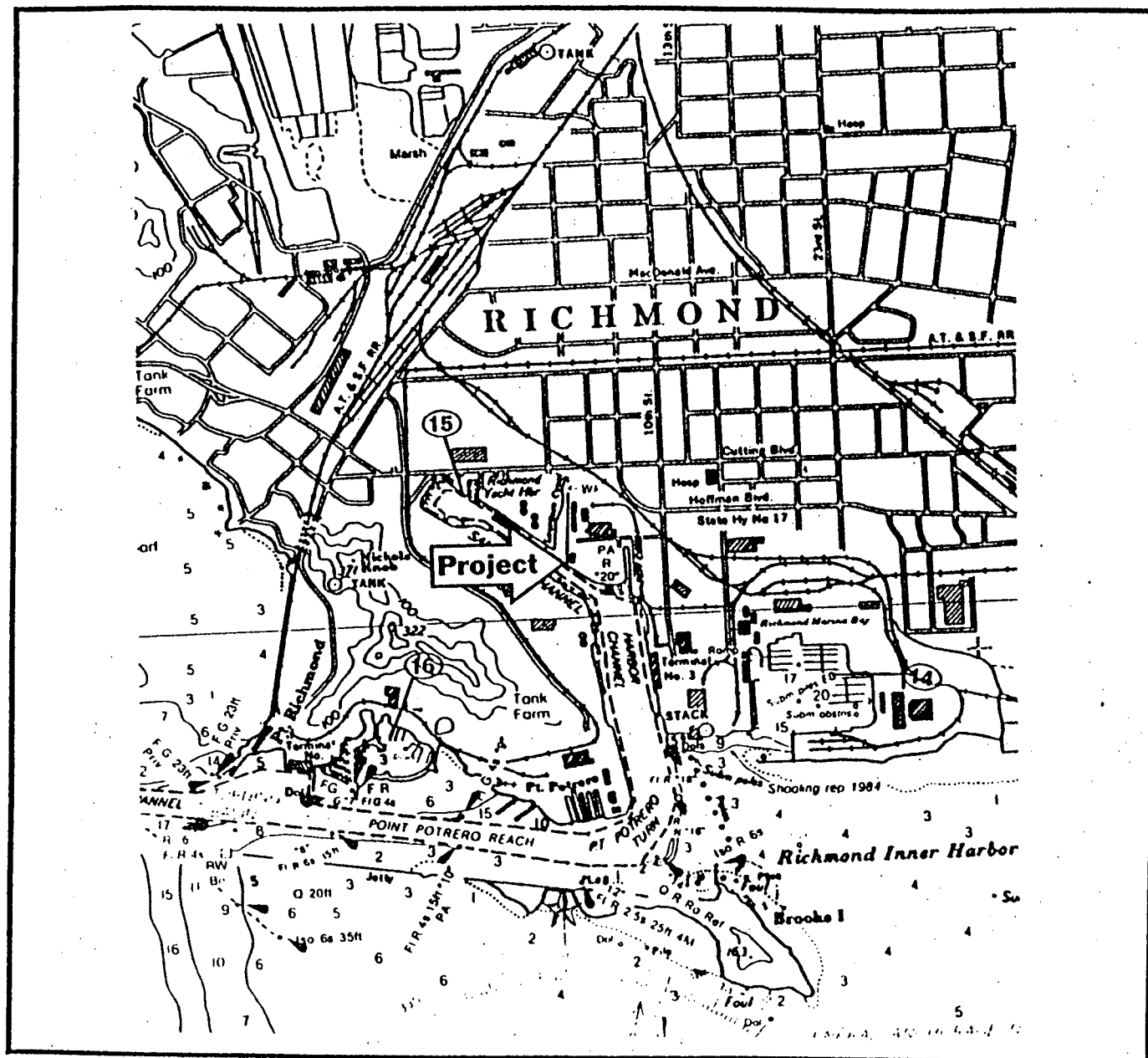
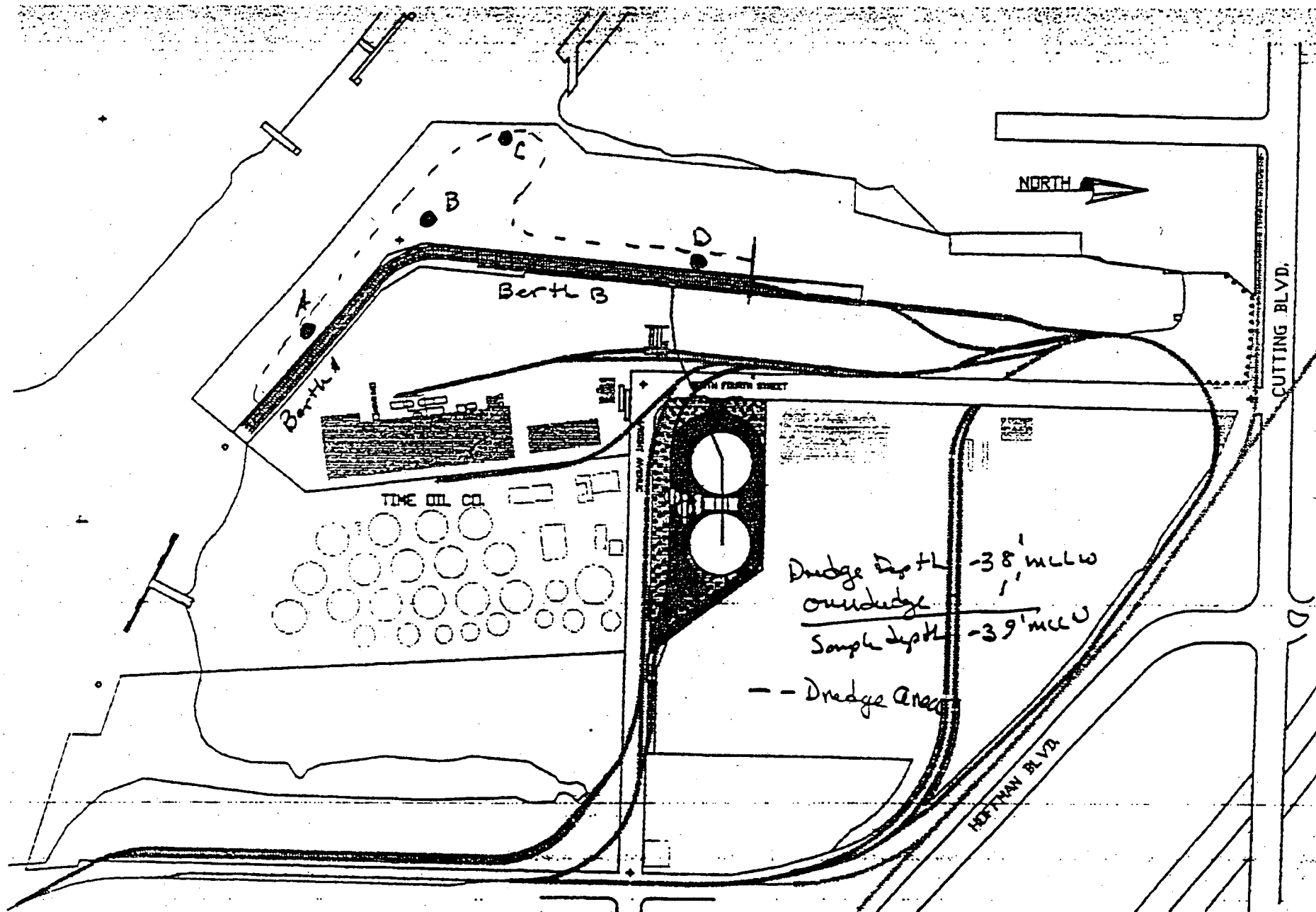


FIGURE 1
VICINITY MAP



PLAN VIEW
LEVIN-RICHMOND TERMINAL

FIGURE 2

PROJECT SITE

2.0 PROPOSED SCOPE OF WORK

2.1 SCOPE OF WORK

The following scope of work is proposed regarding testing of sediments from the Levin Terminal facility in Richmond. Testing requirements are based upon Section 404 of the Clean Water Act and are described in detail in the Inland Testing Manual (ACOE/U.S. EPA/RWQCB/BCDC 1998).

The program management and sampling will be carried out by Advanced Biological Testing (ABT) located in Rohnert Park, California. The analytical chemistry will be carried out by CRG Marine Laboratory in Terminal Island, California. Grain size analysis will be carried out by MEC Analytical Systems Inc. Addresses and contacts at the laboratories are attached to this document.

2.2 SEDIMENT COLLECTION

It is proposed that the outlined area on Figure 2 be tested using four core station locations. The test sample locations have been provided by Dr. Jack Gregg (RWQCB-SF). The sampling stations are shown in Figure 2. Positioning will be by DGPS. Each core sample will be taken to a depth of -38 feet MLLW plus a 1 foot overdredge using a push corer or gravity corer. All station locations will be provided in the final report.

Each collected core will be placed in a food-grade plastic bag, labeled and placed in coolers and returned to the laboratory. A thoroughly mixed sample from each core will be sent for chemical and physical analysis. A total of four samples will be analyzed. A volume of sediment from each station will be archived at 4°C.

2.3 CHEMICAL ANALYSES OF SEDIMENTS

Bulk sediment chemistry will be carried out on each sample. Analyses shown in Table 1 include the analysis for priority pollutant metals using Inductively Coupled Plasma (ICP/MS) techniques. The EPA method 8270 analysis for semivolatile pollutants (PAHs) will be performed using gas chromatography/mass spectrometry

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(GC/MS) following serial extraction with methylene chloride and alumina gel column cleanup procedures. Pesticides will be analyzed by GC using U.S.EPA method 8081A while PCBs will be carried out using method 8082. The analysis of organic tin will be carried out using methods described in Rice (1987). Dissolved sulfides will be run on the bulk sediments. All analytical results will be reported in dry weight. The detection limits to be achieved for sediments (based on dry weight) are also presented in Table 1.

The analysis for asbestos fibers will be carried out by GPI Laboratory in Novato, California using phase contrast microscopy.

The four station samples will also be run for soluble metals using the WET test. Deionized water will be used for extraction purposes. The observed values will be compared to STLC values and Water Quality Objectives.

2.4 PHYSICAL ANALYSES

All four samples will be physically characterized. Physical analyses of the dredge material will include (1) grain size, (2) total organic carbon (TOC), and (3) total solids. The method for grain-size analysis follows Plumb (1981). This method combines the dry sieve and the pipette methods to analyze the smaller particle sizes expected at these sites. The frequency distribution of the size ranges (reported in millimeters) of the sediments will be presented in the report and will be summarized as the percentage of sand, silt, and clay fractions. TOC, made up of volatile and nonvolatile organic compounds, will be determined as recommended in Plumb (1981) by the combustion method. Total solids will also be measured in order to convert chemical concentrations from a wet-weight to dry-weight basis. Total solids will be determined by weighing the organic and inorganic material remaining in a sample after it has been dried at 100°C.

2.5 CHEMICAL ANALYSIS QUALITY ASSURANCE OBJECTIVES

Quality assurance procedures to be used for sediment testing are consistent with methods described in the U.S.EPA/ACOE (1991) and U.S.EPA (1988). The methods employed in this sediment testing program are detailed in standard guides and procedures maintained in the analytical laboratory.

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QA/QC procedures include documentation of the following criteria for each sample matrix type on a 10% frequency:

Accuracy- Samples will either be spiked or a laboratory control material/certified reference material will be analyzed to determine accuracy. Sample spikes will be added prior to processing the sample and carried throughout the entire analytical procedure. Results from spikes and/or reference materials are reported in percent recovery with acceptance ranges and amount spiked or true values. In addition, for the Chlorinated Pesticides/PCBs and the PAHs, surrogates will be spiked into every sample. Percent recoveries for each sample were reported and compared to acceptable ranges.

Precision- The analysis of duplicate samples or duplicate spiked samples can be used to determine analytical precision. Duplicate samples results can also indicate the level of homogeneity of the sample matrix. Relative standard deviations (RSDs) are calculated for all duplicate samples or duplicate spiked samples and are reported along with acceptance ranges. In addition, the RSD for the Chlorinated Pesticides/PCBs and PAH surrogate recoveries are also reported and compared to acceptance ranges.

All sample analyses are performed using EPA Methods, where applicable. Trace metals were analyzed using EPA Method 6020 ICP/MS. Chlorinated Pesticides (8081A) and PCBs (8082), PAHs using EPA 8270C. Daily logs of instrument performance were maintained including Initial and Continuing Calibration Verification. Total Organic Carbon analyses were performed by combustion using an Elemental Analyzer according to Plumb, 1981. The analysis for asbestos will be by phase contrast microscopy.

All QA/QC records for the various testing programs are kept on file for review by regulatory agency personnel.

2.6 REPORT

The project report will consist of a discussion of field and laboratory methods, a summary table of the sediment chemistry, and a log of individual cores. The

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analytical reports for the sediment chemistry and physical analysis, and the quality control and assurance data for the analyses are presented in appendices. The full report will be prepared for submittal to the DMMO as well as the Regional Water Quality Control Board-San Francisco Region for their review.

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TABLE 1
TARGET DETECTION LIMITS

Constituent	Method	Sediment
<u>Metals (mg/kg)</u>		
Arsenic (As)	6020	0.1
Cadmium (Cd)	6020	0.1
Chromium (Cr)	6020	0.1
Copper (Cu)	6020	0.1
Lead (Pb)	6020	0.1
Mercury (Hg)	6020	0.02
Nickel (Ni)	6020	0.1
Selenium (Se)	6020	0.1
Silver (Ag)	6020	0.1
Zinc (Zn)	6020	1.0
<u>Pesticides (µg/kg)</u>	8081A	
2, 4' - DDD		2
2, 4' - DDE		2
2, 4' - DDT		2
4,4' - DDD		2
4,4' - DDE		2
4,4' - DDT		2
Total DDT		2
Aldrin		2
alpha-BHC		2
beta BHC		2
Chlordane		2
delta BHC		2
Dieldrin		2
Endosulfan I		2
Endosulfan II		2
Endosulfan Sulfate		2
Endrin		2
Endrin Aldehyde		2
Heptachlor		2
Heptachlor Epoxide		2
gamma-BHC		2
Toxaphene		20
Total pesticides		
<u>PCBs</u>	8082	
PCB 1016		20
PCB 1221		20
PCB 1232		20
PCB 1242		20
PCB 1248		20
PCB 1254		20
PCB 1370		20
Total PCBs		20

TABLE 1 (Cont'd)

TARGET DETECTION LIMITS

Constituent	Method	Sediment
PAHs ($\mu\text{g/kg}$)	8270C	
Naphthalene		20
Acenaphthylene		20
Acenaphthene		20
Fluorene		20
Phenanthrene		20
Anthracene		20
Fluoranthene		20
Pyrene		20
Chrysene		20
Benzo (A) Anthracene		20
Benzo (K) Fluoranthene		20
Benzo (B) Fluoranthene		20
Benzo (A) Pyrene		20
Ideno (1,2,3-CD) Pyrene		20
Dibenzo (A,H) Anthracene		20
Benzo (G,H,I) Perylene		20
Total PAHs		20
Organotin ($\mu\text{g/kg}$)	GCFPD	
Monobutyltin		1
Dibutyltin		1
Tributyltin		1
TOC (%)	Plumb, 1981	0.1
TRPH (mg/kg)	9071A (1664).	20
Dissolved sulfides (mg/l)	4500S	0.1

3.0
REFERENCES

Plumb, R. H., Jr., 1981, Procedure for Handling and Chemical Analysis of Sediment and Water Samples. Technical Report U.S.EPA /CE-81-1, prepared by Great Lakes Laboratory, State University College at Buffalo, Buffalo, NY, for the U.S. Environmental Protection Agency/Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material. Published by the U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Rice, C., Espourteille, F., and Huggett, R., 1987, A Method for Analysis of Tributyltin in Estuarial Sediments and Oyster Tissue, *Crassostrea virginica*. R. Appl Organometric Chemistry, 1:541-544.

U.S. EPA/ACOE. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U. S.- Testing Manual (Inland Testing Manual). Office of Water. Washington, DC. EPA-823-B-98. February, 1998

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Laboratory Addresses and Contacts

Advanced Biological Testing Inc.
5685 Redwood Dr. #105
Rohnert Park, California 94928
Contact: Dr. Kurt F. Kline (707-588-2880)

CRG Marine Laboratory
820 S. Seaside Avenue
Terminal Island, California 90731
Contact: Mr. Rich Gossett (310-519-4007)

MEC Analytical Systems Inc.
2433 Impala Dr.
Carlsbad, California 92008
Contact: Mr. Brian Riley (760-931-8081)